Chapter 8
I CLAIM:
What is to be claimed

1. A method of designing an essentially digital system, the method comprising: generating a system-level description of the functionality and timing of a digital system, the system-level description comprising a plurality of tasks; optimizing task concurrency in the system-level description, thereby obtaining a task concurrency optimized system-level description that includes Pareto-like task optimization information; and designing the essentially digital system based at least in part upon the task concurrency optimized system-level description.

2. The method of Claim 1, wherein the task concurrency optimized system-level description further includes a description of a real-time operating system that uses the Pareto-like task optimization information.

3. A method of designing an essentially digital system, the method comprising: generating a description of the functionality and timing of the digital system, wherein the description includes a grey-box system-level description comprising a plurality of tasks; optimizing task concurrency in the grey-box system-level description, thereby obtaining a task concurrency optimized grey-box system-level description; and designing the essentially digital system based at least in part upon the task concurrency optimized grey-box system-level description.

4. The method of Claim 3, wherein the task concurrency optimized system-level description further includes a description of a real-time operating system.

5. The method of Claim 1, 2, 3 or 4 wherein optimizing task concurrency comprises separately performing design-time intra-task scheduling for at least two of the tasks, thereby generating a plurality of intra-task schedules for each of the tasks.

6. The method of Claim 5 , wherein the plurality of intra-task schedules are subset of all possible intra-task schedules, wherein the subset includes Pareto optimal schedules.

7. The method of Claim 2, 3 or 4 wherein optimizing task concurrency comprises designing a run-time scheduler that is part of the real-time operating system, wherein the run-time scheduler is capable of dynamically scheduling at least two of the tasks.

8. The method of Claim 1or 3, wherein non-deterministic behavior of the digital system is modeled by interacting the tasks, while each of the tasks describe part of the deterministic behavior of the digital system. 9. The method of Claim 5, wherein the digital system comprises at least one processor, wherein the design-time intra-task scheduling uses processor power consumption optimization information to determine an appropriate scheduling.

9. The method of Claim 5, wherein the digital system comprises a plurality of processors, and wherein the design-time intra-task scheduling uses processor power consumption optimization information to assign at least one of the tasks to at least one of the processors.

10. The method of Claim 9, wherein at least one processor is a multi supply voltage processor.

11. A method of designing an essentially digital system, the method comprising: generating a system-level description of the functionality and timing of the digital system, the system-level description comprising a plurality of tasks; optimizing tasks concurrency in the system-level description by separately performing design-time intra-task scheduling for at least two of the tasks, thereby generating a plurality of intra-task schedules for each of the tasks, wherein the plurality of intra-task schedules is a subset of all possible intra-task schedules, the subset including Pareto optimal schedules; obtaining a task concurrency optimized system-level description, including Pareto-like task optimization information, the subset defining the Pareto-like task optimization

information; and designing the essentially digital system based on the task concurrency optimized system-level description.'

12. The method of Claim 8, wherein optimizing task concurrency comprises designing a run-time scheduler that is part of the real-time operating system, wherein the real-time operating system is capable of performing dynamic scheduling of at least two of the tasks.

13. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform the method, comprising: optimizing task concurrency in a system-level description of the functionality and timing of a digital system, wherein the system-level description comprises a plurality of tasks, wherein optimizing includes separately performing design-time intra-task scheduling for at least two of the tasks, thereby generating a plurality of intra-task schedules for each of the tasks, wherein the plurality of intra-task schedules are a subset of all possible intra-task schedules, and wherein the subset defines Pareto-like task optimization information.

14. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform the method comprising: selecting one or more schedules for a plurality of tasks from a plurality Pareto optimal intra-task schedules; and executing one of the tasks in accordance with the selected schedule.